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Conference Abstract

Using Fuzzy Cognitive Mapping to Collate Expert Knowledge: Diverse impacts of renewable energy on biodiversity and the UN Sustainable Development Goals

Miriam Grace[‡], Alexis Meletiou[§], Myriam Pham-Truffert[|], Marianne Darbi[§], Karla Estela Locher-Krause[§], Henri Rueff[|]

‡ University of East Anglia, Norwich, United Kingdom
§ Helmholtz Centre for Environmental Research - UFZ, Leipzig, Germany
| University of Bern, Bern, Switzerland

Corresponding author: Miriam Grace (miriam.grace@uea.ac.uk)

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Abstract

The European Union (EU) is committed to tackling the issue of climate change, which poses serious risks to the global environment and human well-being. Supporting renewable energy is a key policy direction for the EU to lower its contributions to climate change. However, renewable energy technologies have diverse effects on the environment and on society. These effects can be considered a complex system of interacting elements and are challenging to assess. Conceptual models are a way of synthesizing this information to obtain an overview of the system and essential insights. We present the results of an activity to assess the impacts of EU renewable energy policies on overseas biodiversity and the United Nations (UN) Sustainable Development Goals (SDGs). This was carried out as part of the EKLIPSE (EKLIPSE (Establishing a European Knowledge and Learning Mechanism to Improve the Policy-Science-Society Interface on Biodiversity and Ecosystem Services) mechanism to synthesise environmental knowledge in response to specific requests by decision-makers at the European level. We carried out a

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participatory process to collate expert knowledge into a conceptual model using a Fuzzy Cognitive Mapping Approach (Özesmi and Özesmi 2004), with the Mental Modeler software for mapping (Gray et al. 2013). The participants were guided to connect significant EU policies associated with renewable energy, the technologies they support, and known impacts of these technologies on biodiversity and the SDGs, drawing on a preliminary review of the literature. The individual models obtained were integrated into a single model (see Suppl. material 1 for images). This was then subject to network analysis, which reveals the collective effects of different renewable energy technologies (RETs) on the wider socioecological system. Our findings highlight that RETs have complex and at times disparate effects on biodiversity and the SDGs, acting through a variety of mediating processes. They benefit the SDGs on balance, particularly climate-related SDGs. Mitigation of biodiversity impacts remains a concern, and processes such as habitat change were found to be influential here. Our results suggest that policymakers must focus on implementing appropriate environmental impact assessments, guided by these mediating processes. This would minimize any negative environmental impacts of RETs, while maximizing the benefits.

Keywords

renewable energy, biodiversity, UN Sustainable Development Goals, sustainable development, fuzzy cognitive mapping, participatory processes, conceptual modelling, network analysis, European Union, policy

Presenting author

Miriam Grace

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Supplementary material

Suppl. material 1: Supporting images of the integrated conceptual model, collating expert understanding of the effects of renewable energy policies and technologies on biodiversity and the UN Sustainable Development Goals. doi

Authors: Miriam Grace et al.
Data type: Supporting images
Brief description: This file contains images of the integrated conceptual model of expert understanding of the effects of renewable energy policies and technologies on biodiversity and the UN Sustainable Development Goals.
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